NEC

# SILICON TRANSISTOR
# 2SD1615, 1615A

## NPN SILICON EPITAXIAL TRANSISTOR
## POWER MINI MOLD

### DESCRIPTION

2SD1615, 1615A are designed for audio frequency power amplifier and switching application, especially in Hybrid Integrated Circuits.

### FEATURES

- Low $V_{CE\ (sat)}$ $V_{CE(sat)}$ = 0.15 V
- Complement to 2SB1115, 1115A

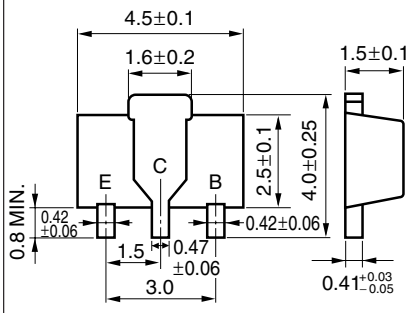
### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C)

| | | 2SD1615 | 2SD1615A | |
|---|---|---|---|---|
| Collector to Base Voltage | $V_{CBO}$ | 60 | 120 | V |
| Collector to Emitter Voltage | $V_{CEO}$ | 50 | 60 | V |
| Emitter to Base Voltage | $V_{EBO}$ | 6.0 | | V |
| Collector Current (DC) | $I_{C\ (DC)}$ | 1.0 | | A |
| Collector Current (Pulse)* | $I_{C\ (Pulse)}$ | 2.0 | | A |
| Total Power Dissipation ** | $P_T$ | 2.0 | | W |
| Junction Temperature | $T_j$ | 150 | | °C |
| Storage Temperature Range | $T_{stg}$ | −55 to +150 | | °C |

* PW ≤ 10 ms, Duty Cycle ≤ 50%

** When mounted on ceramic substrate of 16 cm² × 0.7 mm

### PACKAGE DIMENSIONS
in millimeters




E. Emitter
C. Collector
B. Base

### ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C)

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS | |
|---|---|---|---|---|---|---|---|
| Collector Cutoff Current | $I_{CBO}$ | | | 100 | nA | 2SD1615 | $V_{CB}$ = 60 V, $I_E$ = 0 |
| | | | | 100 | nA | 2SD1615A | $V_{CB}$ = 120 V, $I_E$ = 0 |
| Emitter Cutoff Current | $I_{EBO}$ | | | 100 | nA | $V_{EB}$ = 6.0 V, $I_C$ = 0 | |
| DC Current Gain | $h_{FE1}$*** | 135 | 290 | 600 | | 2SC1615 | $V_{CE}$ = 2.0 V, $I_C$ = 100 mA |
| | | 135 | | 400 | | 2SD1615A | |
| DC Current Gain | $h_{FE2}$*** | 81 | 270 | | | $V_{CE}$ = 2.0 V, $I_C$ = 1.0 A | |
| Collector Saturation Voltage | $V_{CE(sat)}$*** | | 0.15 | 0.3 | V | $I_C$ = 1.0 A, $I_B$ = 50 mA | |
| Base Saturation Voltage | $V_{BE(sat)}$*** | | 0.9 | 1.2 | V | $I_C$ = 1.0 A, $I_B$ = 50 mA | |
| Base to Emitter Voltage | $V_{BE}$*** | 600 | | 700 | mV | $V_{CE}$ = 2.0 V, $I_C$ = 50 mA | |
| Gain Bandwidth Product | $f_T$ | 80 | 160 | | MHz | $V_{CE}$ = 2.0 V, $I_E$ = −100 mA | |
| Output Capacitance | $C_{ob}$ | | 19 | | pF | $V_{CB}$ = 10 V, $I_E$ = 0, f = 1.0 MHz | |

*** Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2 %

$h_{FE}$ Classification

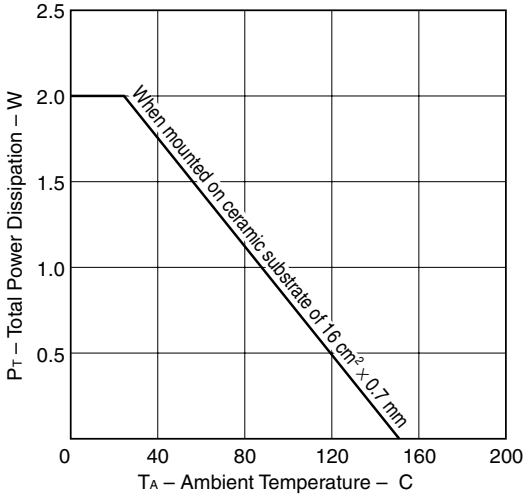
| MARKING | 2SD1615 | GM | GL | GK |
|---|---|---|---|---|
| | 2SD1615A | GQ | GP | |
| $h_{FE1}$ | | 135 to 270 | 200 to 400 | 300 to 600 |



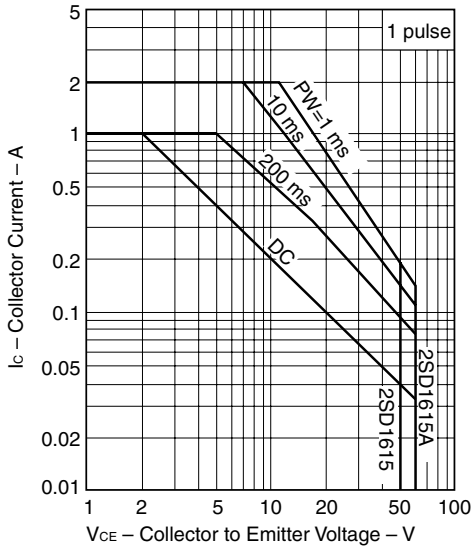
Document No. D10198EJ5V0DS00 (5th edition)
Date Published March 2006 NS CP(K)
Printed in Japan

## TYPICAL CHARACTERISTICS ($T_A$ = 25°C)

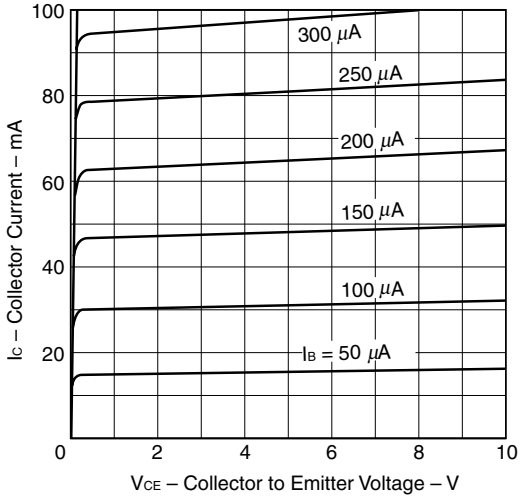
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



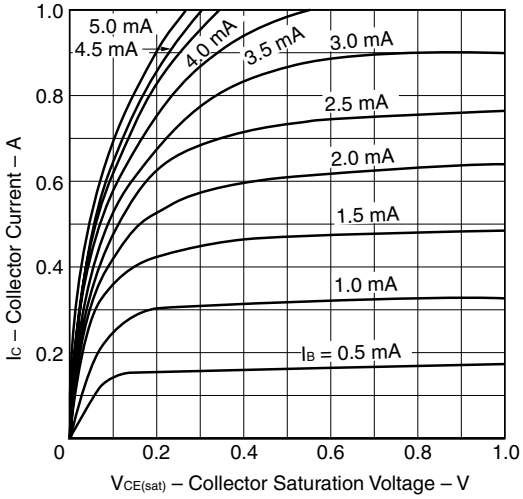

SAFE OPERATING AREA (TRANSIENT THERMAL RESISTANCE METHOD)



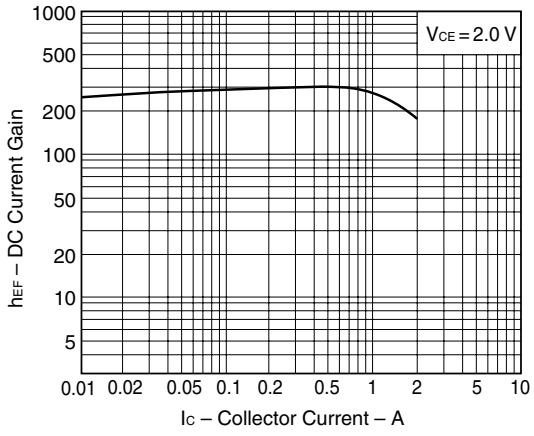

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



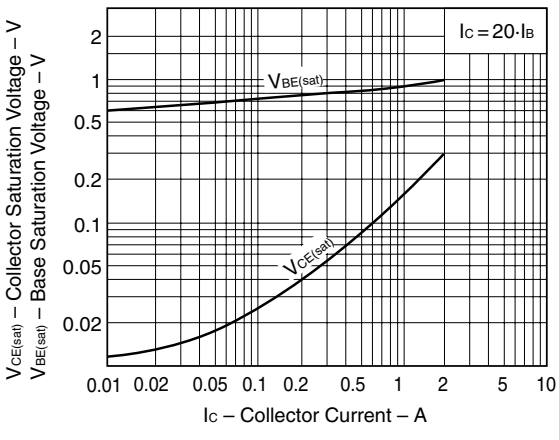

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



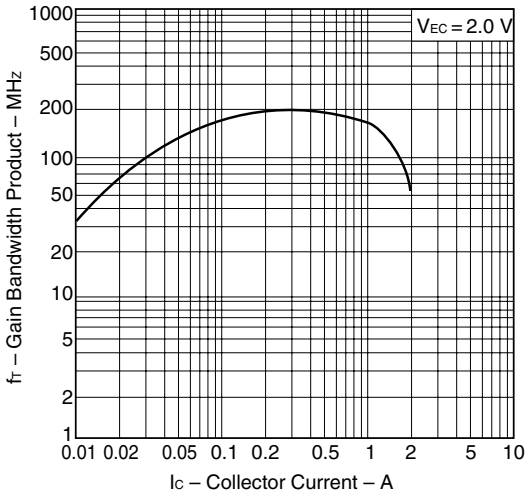

DC CURRENT GAIN vs. COLLECTOR CURRENT



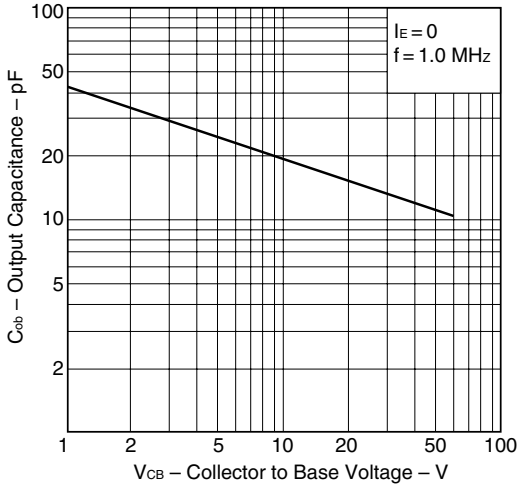

COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



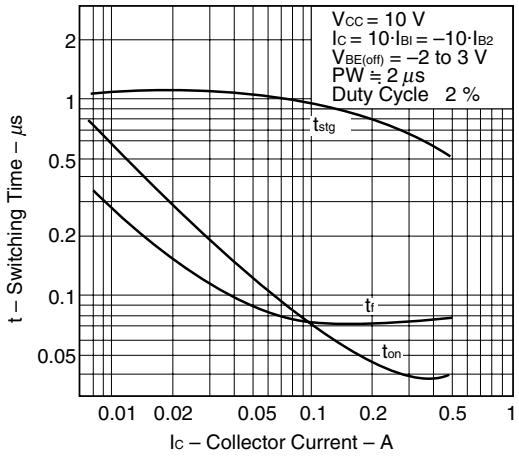
GAIN BANDWIDTH PRODUCT vs.
EMITTER CURRENT




OUTPUT CAPCITANCE vs.
COLLECTOR TO BASE VOLTAGE




SWITCHING TIME vs.
COLLECTOR CURRENT



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